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## LIGHT TRAP CATCHES OF LEPIDOPTERA IN TWO CENTRAL APPALACHIAN FORESTS

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*Abstract.*—On 15 sampling dates from May through mid-August 1995 and 1996, 12-watt blacklight traps were operated simultaneously in 18, 200-ha plots, 9 plots each in the George Washington (GWNF) and Monongahela National Forests (MNF) in Virginia and West Virginia, respectively. A total of 438 species of Lepidoptera in 13 selected families was identified including 222 noctuids, 127 geometrids, 27 notodontids, 26 arctiids, 10 sphingids and 9 saturniids. For both years, 334 species were shared by both forests; 45 species were collected only in the GWNF and 59 species were collected only in the MNF. Moth collections totaled 135,271 specimens and varied by forest and year. Variation may have been related to differences in vegetational makeup between the forests and differences in rainfall and temperature between the two years. The GWNF is a warmer, more xeric oak/pine forest while the MNF is relatively more mesic, mixed hardwood forest at a higher elevation. For both forests combined, the most abundant light-trapped species were, in decreasing abundance, *Acronicta ovata* Grote (Noctuidae), *Idia rotundalis* (Walker) (Noctuidae), *Hypoprepia fucosa* Hübner (Arctiidae), *Idia aemula* Hübner (Noctuidae), *Polygrammate hebracicum* Hübner (Noctuidae), *Hydrelia inornata* Hulst (Noctuidae), *Itame pustularia* (Guenée) (Geometridae), *Spilosoma congrua* Walker (Arctiidae), *Lambdina fervidaria* (Hübner) (Geometridae), and *Halysidota tessellaris* (J. E. Smith) (Arctiidae).

*Key Words:* Lepidoptera, blacklight trap, West Virginia, Virginia

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Communities of adult Lepidoptera have been the subject of numerous studies in recent years. Lepidoptera are considered to be of high conservation value (Magurran 1985) and frequently serve as “flagship taxa” in biodiversity studies (Lawton et al. 1998). Moths have been used as indicator organisms for monitoring changes in tropical (Holloway 1984) and temperate zones (Magurran 1985).

In North America, blacklight trapping of moths has been conducted in several locations for a number of purposes. For example, Rings et al. (1987) and Moulding and Madenjian (1979) conducted surveys in the

same forests for several years to determine composition of the Lepidoptera community. Use of light traps in evaluation of sampling methods for biodiversity studies was conducted by Butler et al. (1999), Thomas (1996), and Thomas and Thomas (1994). Studies to determine Lepidoptera baseline composition before forest disturbance by outbreak defoliator species or application of insecticides for forest pest suppression have included those of Butler and Kondo (1991) and Grimble et al. (1992). Light trapping of moths has also served to evaluate nontarget impact of forest-applied insecticides (Butler and Kondo 1993, Butler et al. 1995, Sample et al. 1996).

In 1994, we began a study of the impact of the biological spray, *Bacillus thuringiensis* var. *kurstaki* (*Btk*), and defoliation by gypsy moth (*Lymantria dispar* L.) on non-target arthropods in large plots in adjacent national forests in the central Appalachians. Because *Btk* targets caterpillars (Boberschmidt et al. 1989), an emphasis of this study has been Lepidoptera. Our study dealt with moths from 13 selected families: Drepanidae, Thyatiridae, Geometridae, Epiplemiidae, Mimallonidae, Apatelodidae, Lasio-campidae, Saturniidae, Sphingidae, Notodontidae, Arctiidae, Lymantriidae, and Noctuidae. Pretreatment sampling of adult moths was conducted in 1995 and 1996. Comparisons were made of number of species and abundance between the two years and between the two forests. Here we present the results of the pretreatment portion of that study. Other papers in this series present results of larval sampling by foliage pruning and canvas bands. A final paper will present species diversity indices and accumulation curves for the lepidopteran community.

#### MATERIALS AND METHODS

In 1994, 18 200-ha study plots were designated and flagged in gypsy moth-susceptible, oak-dominated forests. Plots 1 through 9 are located primarily on the eastern slope of Great North Mountain in the Deerfield Ranger District of the George Washington National Forest (GWNF) in Augusta County, Virginia (centered at 38°07'30"N, 79°22'30"W). The GWNF plots are approximately 50 km east of the MNF plots. Maps of the study sites are given in Butler and Strazanac (2000 a,b). The GWNF plots represent a relatively xeric forest of mixed oak and pine with a range in elevation of 586 m to 781 m. Plots 10 through 18 are located in the Monongahela National Forest (MNF) in Pocahontas County, West Virginia (plots 10–15 centered at 38°22'30"N, 79°52'30"W, plots 16–18 centered at 38°15'N, 80°00'W). Plots 10 through 12 are in the southern Greenbrier

Ranger District on Chestnut Ridge (Paddy Knob North); plots 13 through 18 are in the Marlinton Ranger District with plots 13 through 15 near Sugar Camp Run (Paddy Knob South); and plots 16 through 18 on Marlin Mountain. The MNF plots represent a relatively more mesic forest with a range of elevation of 860 m to 1,070 m.

Basal area of major tree species was measured at 28 randomly selected points within a central 30-ha core subplot within each of the 18 plots. Basal area was estimated using a 10 basal area factor (BAF) Cruz-all (Jim-Gem; Forestry Suppliers, Inc.; Jackson, MS).

On 20 June 1995, rain gauges and maximum/minimum thermometers were installed in all plots. Additional weather data were obtained from the N.O.A.A. weather stations closest to the plots.

A 12-watt blacklight trap (BioQuip Products, Gardena, CA) powered by a 12-volt battery was operated within the 30-ha core subplot in each of the 18 study plots on Monday night of each week from early May through mid-August (8 May through 14 August 1995; 6 May through 12 August, 1996) to give 15 samples per plot per year. Each trap was equipped with a photoelectric eye to facilitate automatic dusk to dawn operation. Insects were killed by Vapona<sup>™</sup> insecticide strips placed in the light trap bucket. Each trap was suspended about 1.5 m above the ground between two trees, approximately 2 m apart. Care was taken in trap placement to select locations that appeared similar among plots with regard to vegetation density and composition (within the limitations of core plot differences), and to avoid sites where traps would be shielded by tree limbs.

Trapped insects were collected each Tuesday morning, placed in plastic cartons between layers of Kimwipes<sup>™</sup>, held in coolers, returned to the laboratory, and stored in a freezer. Moths were identified to species by Kondo and Butler and counts made by week for each species. Species are named after the checklist given by Hodges

et al. (1983). Voucher specimens from the study are deposited in the WVU Arthropod Collection.

### RESULTS

A total of 438 species of moths in 13 families was collected by blacklight trap in 1995 and 1996 (Table 1). Fifty-one percent of the species were Noctuidae (222 species), 29 percent were Geometridae (127 species), 6 percent each were Notodontidae (27 species) and Arctiidae (26 species), and 2 percent each were Sphingidae (10 species) and Saturniidae (9 species). These percentages of species per family are similar to those given in Hodges' (1983) checklist where these families represented 58 percent, 28 percent, 3 percent, 5 percent, 2.5 percent, and 1.4 percent respectively. The remaining 7 families were represented by 5 or fewer species. Over both years, 379 and 393 species were collected from the GWNF and the MNF, respectively. Collections for 1995 totaled 339 and 334 species for the GWNF and the MNF, respectively, while 1996 numbers were 313 and 338 species. For both years, 334 species were shared by both forests; 45 species were represented only in the GWNF, and 59 species were collected only in the MNF (Table 1).

During both years of the study and in both forests, a total of 135,271 moths were collected and identified (Table 1). The highest abundance of moths was collected on the MNF in 1996 (39,069); followed by GWNF, 1995 (35,745); MNF, 1995 (35,593); and GWNF, 1996 (24,864). The family with the highest abundance for both forests and both years was Noctuidae with 65,115 individuals followed by Geometridae (37,744), Arctiidae (18,279), Notodontidae (9,839), Lasiocampidae (1,400), Saturniidae (1,286), Sphingidae (856), and Lymantriidae (474). All other families were represented by fewer than 100 individuals.

Over both years and both forests the most abundant species listed in order of decreasing abundance were *Acronicta ovata* Grote (Noctuidae), *Idia rotundalis* (Walker) (Noctuidae),

*Hypoprepia fucosa* Hübner (Arctiidae), *Idia aemula* Hübner (Noctuidae), *Polygrammate hebraicum* Hübner (Noctuidae), *Hydrelia inornata* Hulst (Geometridae), *Itame pustularia* (Guenée) (Geometridae), *Spilosoma congrua* Walker (Arctiidae), *Lambdina fervidaria* (Hübner) (Geometridae), *Halysidota tessularis* (J.E. Smith) (Arctiidae), *Acronicta increta* Morrison (Noctuidae), *Acronicta haesitata* (Grote) (Noctuidae), *Clemensia albata* Packard (Arctiidae), *Probole alienaria* (Herrich-Schäffer) (Geometridae), *Hypagyrtis unipunctata* (Haworth) (Geometridae), *Nadata gibbosa* (J.E. Smith) (Noctuidae), *Peridea angulosa* (J.E. Smith) (Noctuidae), *Eupithecia matheri* Rindge (Geometridae), *Anorthodes tarda* Guenée (Noctuidae), and *Semiothisa bisignata* (Walker) (Geometridae) (Table 1).

Among the 20 more abundant species, 7 were notably more abundant in the MNF (*A. ovata*, *I. rotundalis*, *H. inornata*, *S. congrua*, *L. fervidaria*, *P. alienaria*, and *A. tarda*); 4 were notably more abundant in the GWNF (*I. aemula*, *P. hebraicum*, *I. pustularia* and *S. bisignata*). The remaining 9 species were in similar abundance in both forests (Table 1). Among the 438 species identified during this study (Table 1), 35 were represented over both years by a single individual.

During 1995 and 1996 combined, 45 moth species were trapped only in the GWNF and 59 species were trapped only in the MNF. Of those 104 species, half (53 species) were represented by only one or two individuals (Table 1). Several species trapped only in the GWNF in some abundance were the geometrid, *Lytrosis permagnaria* (Pack); the saturniids, *Eacles imperialis* (Drury) and *Anisota stigma* (F.); the arctiids, *Crambidia cephalica* (Grote and Robinson); and the noctuids *Catocala flebilis* Grote and *C. similis* Edwards. Among species unique to the MNF were the geometrids *Itame evagaria* (Hulst), *Aethalura intertexta* (Walker), *Epirrhoe alternata* (Müller), and *Heterophleps refusaria*

Table 1. Species of Lepidoptera and their abundance collected by light traps on the George Washington (GWNF) and Monongahela (MNF) national forests, 1995 and 1996. Ranks and flight ranges are included.

Family Species	GWNF		MNF		Grand Total	Rank	Flight Period	
	1995	1996	Total	1996				Total
<b>Apateleodidae</b>								
<i>Apateleodes torrefacta</i> (J.E. Smith)	1	5	6	1	1	7	199	10 Jun-17 Jul
<i>Olceclostera angelica</i> (Grote)	0	4	4	1	2	6	200	26 Jun-15 Jul
<b>Arctiidae</b>								
<i>Apantesis anna</i> (Grote)	13	21	34	1	3	37	171	29 May-26 Jun
<i>Apantesis figurata</i> (Drury)	4	0	4	0	0	4	202	22 May-29 May
<i>Apantesis nais</i> (Drury)	8	2	10	0	0	10	196	13 May-12 Jun
<i>Apantesis virgo</i> (L.)	0	0	0	1	1	1	205	17 Jul
<i>Cisseps fulvicollis</i> (Hübner)	1	0	1	0	0	1	205	31 Jul
<i>Cisthene plumbea</i> Stretch	43	14	57	3	6	63	149	5 Jun-14 Aug
<i>Clemensia albata</i> Packard	913	216	1,129	713	258	2,100	13	15 May-14 Aug
<i>Crambidia cephalica</i> (Grote & Robinson)	224	54	278	0	0	278	81	22 Jul-14 Aug
<i>Crambidia pallida</i> Packard	235	36	271	187	37	495	56	27 May-14 Aug
<i>Cyrcia tenera</i> Hübner	2	2	4	0	0	4	202	1 Jul-7 Aug
<i>Epantheria scribonia</i> (Stoll)	0	2	2	0	0	2	204	24 Jun
<i>Euchaetes egle</i> (Drury)	2	0	2	1	3	5	201	24 Jun-3 Jul
<i>Halysidota tessellaris</i> (J.E. Smith)	681	1,068	1,749	454	935	3,138	10	22 May-14 Aug
<i>Haploa clymene</i> (Brown)	3	1	4	4	6	10	196	3 Jul-5 Aug
<i>Haploa colona</i> (Hübner)	3	1	4	2	8	12	194	26 Jun-8 Jul
<i>Haploa contigua</i> (Walker)	4	0	4	1	1	5	201	3 Jul
<i>Haploa lecontei</i> (Guérin-Méneville)	79	89	168	37	88	256	85	10 Jun-5 Aug
<i>Holomelina aurantiaca</i> (Hübner)	7	0	7	0	0	7	199	29 May-31 Jul
<i>Holomelina opella</i> (Grote)	157	116	273	9	37	310	77	22 May-7 Aug
<i>Hyphantria cunea</i> (Drury)	3	0	3	509	0	509	53	19 Jun-10 Jul
<i>Hypoprepia fucosa</i> Hübner	2,073	1,237	3,310	2,904	4,057	7,367	3	19 Jun-14 Aug
<i>Hypoprepia miniata</i> (W.F. Kirby)	56	31	87	6	12	99	128	8 Jul-5 Aug
<i>Lophocampa caryae</i> Harris	8	1	9	1	1	10	196	22 May-5 Jun
<i>Pyrrharctia isabella</i> (J.E. Smith)	1	3	4	0	9	13	193	3 Jun-5 Aug
<i>Spilosoma congrua</i> Walker	604	396	1,000	246	2,292	3,538	8	6 May-7 Aug
<i>Spilosoma latipennis</i> Stretch	0	1	1	0	1	2	204	3 Jun-24 Jun
<b>Drepanidae</b>								
<i>Drepana arcuata</i> Walker	4	4	8	24	24	56	154	6 May-14 Aug

Table 1. Continued.

Family Species	GWNF			MNF			Grand Total	Rank	Flight Period	
	1995		1996	1995		1996				Total
	1995	1996	Total	1995	1996					
<i>Oreta rosea</i> (Walker)	16	5	21	6	3	9	30	177	29 May-14 Aug	
Epiplemidae	26	35	61	2	0	2	63	149	29 May-14 Aug	
<i>Calledapteryx dryopterata</i> Grote										
Geometridae										
<i>Aethalura intertexta</i> (Walker)	0	0	0	23	7	30	30	177	6 May-10 Jul	
<i>Anacamptodes defectaria</i> (Guenée)	9	97	106	0	98	98	204	96	3 Jun-12 Aug	
<i>Anacamptodes ephyraria</i> (Walker)	0	41	41	0	82	82	123	119	24 Jun-5 Aug	
<i>Anagoga occiduaria</i> (Walker)	4	1	5	7	17	24	29	178	6 May-12 Aug	
<i>Anavitrinella pampinaria</i> (Guenée)	191	19	210	213	17	230	440	61	6 May-14 Aug	
<i>Antepione thisoaria</i> (Guenée)	5	35	40	0	2	2	42	166	6 May-5 Aug	
<i>Anticlea multiferrata</i> (Walker)	1	0	1	0	0	0	1	205	8 May	
<i>Anticlea vasilicata</i> Guenée	0	1	1	0	1	1	2	204	6 May-20 May	
<i>Besma endropiaria</i> (Grote & Robinson)	30	115	145	553	228	781	926	32	22 May-10 Jul	
<i>Besma quercivoraria</i> (Guenée)	180	220	400	394	248	642	1,042	28	6 May-14 Aug	
<i>Biston betularia</i> (L.)	101	94	195	89	105	194	389	68	6 May-14 Aug	
<i>Cabera erythemaria</i> Guenée	16	16	32	94	112	206	238	90	6 May-3 Jul	
<i>Campaea perlata</i> (Guenée)	188	102	290	299	169	468	758	41	22 May-5 Aug	
<i>Caripeta angustiorata</i> Walker	0	0	0	3	0	3	3	203	24 Jul	
<i>Caripeta aretaria</i> (Walker)	12	7	19	5	13	18	37	171	27 May-14 Aug	
<i>Caripeta divisata</i> Walker	2	18	20	50	52	102	122	120	19 Jun-12 Aug	
<i>Cepphis armataria</i> (Herrich-Schäffer)	2	2	4	2	4	6	10	196	19 Jun-29 Jul	
<i>Chlorochlamys chloroleucaria</i> (Guenée)	1	3	4	0	1	1	5	201	20 May-10 Jun	
<i>Cladara anguilinea</i> (Grote & Robinson)	1	9	10	1	6	7	17	189	6 May-15 May	
<i>Cladara atroliturata</i> (Walker)	9	0	9	36	17	53	62	150	6 May-1 Jul	
<i>Cyclophora packardi</i> (Prout)	12	23	35	12	25	37	72	142	6 May-12 Aug	
<i>Cyclophora pendulinaria</i> (Guenée)	29	47	76	45	130	175	251	87	6 May-14 Aug	
<i>Dichorda iridaria</i> (Guenée)	1	1	2	0	0	0	2	204	29 May-5 Aug	
<i>Dyspteris abortivaria</i> (Herrich-Schäffer)	0	1	1	2	3	5	6	200	22 May-12 Aug	
<i>Dysstroma hersiliata</i> (Guenée)	0	0	0	0	2	2	2	204	17 Jun-1 Jul	
<i>Dysstroma truncata</i> (Hufnagel)	0	0	0	1	0	1	1	205	3 Jul	
<i>Ectropis crepuscularia</i> (Denis & Schiffmüller)	4	40	44	1	48	49	93	132	6 May-29 Jul	
<i>Ennomos subsignaria</i> (Hübner)	1	0	1	0	1	1	2	204	3 Jul-5 Aug	
<i>Epimecis hortaria</i> (F.)	2	8	10	2	1	3	13	193	15 May-5 Aug	

Table 1. Continued.

Family Species	GWNF		MNF		Grand Total	Rank	Flight Period		
	1995	1996	Total	1995				1996	Total
<i>Epirrhoe alternata</i> (Müller)	0	0	0	7	8	15	191	22 May-3 Jul	
<i>Erastria coloraria</i> (F.)	1	1	2	0	0	0	204	17 Jun-26 Jun	
<i>Eubaphe mendica</i> (Walker)	21	37	58	6	11	17	140	17 Jul	
<i>Euchlaena irrorata</i> (Barnes & McDunnough)	11	12	23	6	13	19	166	8 May-3 Jul	
<i>Euchlaena marginaria</i> (Minot)	7	1	8	2	2	4	194	8 May-29 May	
<i>Euchlaena milnei</i> McDunnough	9	0	9	3	0	3	194	26 Jun-3 Jul	
<i>Euchlaena obtusaria</i> (Hübner)	7	7	14	4	6	10	182	22 May-14 Aug	
<i>Euchlaena pectinaria</i> (Denis & Schiffermüller)	4	12	16	2	2	4	186	8 May-1 Jul	
<i>Euchlaena tigrinaria</i> (Guenée)	7	2	9	19	18	37	162	29 May-15 Jul	
<i>Eufidonia notataria</i> (Walker)	40	51	91	83	33	116	95	15 May-19 Jun	
<i>Eugonobapta nivosaria</i> (Guenée)	15	7	22	12	7	19	167	19 Jun-5 Aug	
<i>Eulithis diversilineata</i> (Hübner)	20	30	50	6	13	19	145	8 Jul-14 Aug	
<i>Eulithis explanata</i> (Walker)	15	3	18	28	6	34	157	19 Jun-7 Aug	
<i>Euphyia unangulata</i> (Haworth)	4	3	7	48	18	66	141	20 May-14 Aug	
<i>Eupithecia columbiata</i> Dyar	1	6	7	0	15	15	184	6 May-5 Aug	
<i>Eupithecia matheri</i> Rindge	530	296	826	376	318	694	18	6 May-14 Aug	
<i>Eusarca confusaria</i> Hübner	4	2	6	1	3	4	196	3 Jun-7 Aug	
<i>Eutrapela clemataria</i> (J.E. Smith)	2	20	22	11	14	25	161	6 May-5 Aug	
<i>Glana cribrataria</i> (Guenée)	3	0	3	2	24	26	178	22 May-1 Jul	
<i>Glenoides texanaria</i> (Hulst)	0	78	78	0	169	169	88	8 Jul-29 Jul	
<i>Heliomata cycladata</i> Grote & Robinson	42	54	96	34	64	98	97	6 May-26 Jun	
<i>Hesperumia sulphuraria</i> Packard	22	3	25	3	1	4	178	24 Jun-17 Jul	
<i>Heterophleps refusaria</i> (Walker)	0	0	0	16	8	24	182	29 May-5 Aug	
<i>Heterophleps triguttaria</i> Herrich-Schäffer	0	1	1	14	19	33	173	10 Jun-12 Aug	
<i>Hethemia pistasciaria</i> (Guenée)	3	2	5	0	0	0	201	15 May-17 Jun	
<i>Homochlodes disconventa</i> (Walker)	2	0	2	192	112	304	78	6 May-7 Aug	
<i>Hydrelia condensata</i> (Walker)	0	11	11	1	6	7	188	27 May-29 Jul	
<i>Hydrelia inornata</i> (Hulst)	163	20	183	2,232	1,928	4,160	6	6 May-14 Aug	
<i>Hydria prunivorata</i> (Ferguson)	6	0	6	10	1	11	17	29 May-14 Aug	
<i>Hydriomena pluvialata</i> (Guenée)	79	41	120	217	23	240	71	6 May-3 Jul	
<i>Hydriomena transfigurata</i> Swett	16	98	114	29	200	229	72	6 May-1 Jul	
<i>Hypagyrtis unipunctata</i> (Haworth)	422	397	819	431	608	1,039	15	15 May-14 Aug	
<i>Hypomecis umbrosaria</i> (Hübner)	10	20	30	0	1	1	176	15 May-12 Aug	
<i>Idaea furciferata</i> (Packard)	10	0	10	2	0	2	194	10 Jul-14 Aug	
<i>Idaea obfusaria</i> (Walker)	2	4	6	0	0	0	200	8 Jul-17 Jul	



Table 1. Continued.

Family Species	GWNF		MNF		Grand Total	Rank	Flight Period		
	1995	1996	Total	1996				1995	Total
<i>Iridopsis larvaria</i> (Guenée)	107	108	215	179	218	397	612	47	6 May-14 Aug
<i>Itame evagaria</i> (Hulst)	0	0	0	4	9	13	13	193	24 Jun-10 Jul
<i>Itame pustularia</i> (Guenée)	1,968	768	2,736	1,150	344	1,494	4,230	7	17 Jun-14 Aug
<i>Itame subcessaria</i> (Walker)	1	0	1	2	2	4	5	201	3 Jul-31 Jul
<i>Lambdina fervidaria</i> (Hübner)	391	665	1,056	860	1,471	2,331	3,387	9	6 May-14 Aug
<i>Lambdina pellucidaria</i> (Grote & Robinson)	29	67	96	5	49	54	150	112	6 May-22 May
<i>Lobophora nivigerata</i> Walker	0	2	2	3	0	3	5	201	6 May-29 May
<i>Lomographa glomeraria</i> (Grote)	1	0	1	28	66	94	95	131	6 May-22 May
<i>Lomographa semiclarata</i> (Walker)	0	0	0	0	1	1	1	205	20 May
<i>Lomographa vestaliata</i> (Guenée)	30	66	96	384	491	875	971	30	6 May-22 Jul
<i>Lytrosis permagnaria</i> (Packard)	10	4	14	0	0	0	14	192	3 Jun-17 Jun
<i>Lytrosis unitaria</i> (Herrich-Schäffer)	235	299	534	125	141	266	800	38	10 Jun-24 Jul
<i>Melanolophia canadaria</i> (Guenée)	195	117	312	235	277	512	824	37	6 May-14 Aug
<i>Melanolophia signataria</i> (Walker)	0	0	0	2	6	8	8	198	6 May-8 May
<i>Mesoleuca ruficollata</i> (Guenée)	0	1	1	2	1	3	4	202	20 May-24 Jul
<i>Metanema inatomaria</i> (Guenée)	0	0	0	1	5	6	6	200	10 Jun-5 Aug
<i>Metarranthus angularia</i> (Barnes & McDunnough)	10	0	10	6	0	6	16	190	3 Jul-14 Aug
<i>Metarranthus duaria</i> (Guenée)	3	1	4	3	4	7	11	195	8 May-19 Jun
<i>Metarranthus hypocharia</i> (Herrich-Schäffer)	0	5	5	2	32	34	39	169	20 May-24 Jun
<i>Metarranthus obfirmaria</i> (Hübner)	7	0	7	15	0	15	22	184	8 May-26 Jun
<i>Nacophora quernaria</i> (J.E. Smith)	18	79	97	31	42	73	170	104	6 May-10 Jul
<i>Nematocampa limbata</i> (Haworth)	80	98	178	65	31	96	274	82	17 Jun-14 Aug
<i>Nemoria bistrigaria</i> Hübner	31	114	145	31	77	108	253	86	6 May-14 Aug
<i>Nemoria lixaria</i> (Guenée)	0	38	38	1	25	26	64	148	6 May-7 Aug
<i>Nemoria mimosaria</i> (Guenée)	44	7	51	60	16	76	127	116	20 May-31 Jul
<i>Nepytia semiclusaria</i> (Walker)	121	112	233	17	6	23	256	85	10 Jul-14 Aug
<i>Orthofidonia flaviventa</i> (Hulst)	1	0	1	0	0	0	1	205	8 May
<i>Orthonama centrostrigaria</i> (Wollaston)	12	23	35	22	24	46	81	138	29 May-14 Aug
<i>Orthonama obstipata</i> (F.)	2	3	5	4	8	12	17	189	8 May-12 Aug
<i>Patalene olyzonaria</i> (Walker)	0	1	1	0	0	0	1	205	5 Aug
<i>Perizoma basaliata</i> (Walker)	0	0	0	2	0	2	2	204	10 Jul
<i>Pero honestaria</i> (Walker)	33	41	74	42	67	109	183	99	6 May-14 Aug
<i>Pero morrisonaria</i> (Henry Edwards)	0	0	0	2	1	3	3	203	20 May-12 Jun
<i>Phigalia titea</i> (Cramer)	0	0	0	2	0	2	2	204	15 May-22 May

Table 1. Continued.

Family Species	GWNF			MNF			Grand Total	Rank	Flight Period
	1995	1996	Total	1995	1996	Total			
	<i>Plagodis alchoolaria</i> (Guenée)	241	308	549	145	226			
<i>Plagodis fervidaria</i> (Herrich-Schäffer)	0	246	246	0	65	65	311	76	6 May-12 Aug
<i>Plagodis kuetzingi</i> (Grote)	0	2	2	1	2	3	5	201	20 May-5 Aug
<i>Plagodis phlogosaria</i> (Guenée)	265	49	314	125	125	250	564	51	6 May-12 Aug
<i>Plagodis serinaria</i> Herrich-Schäffer	21	34	55	284	457	741	796	39	15 May-26 Jun
<i>Probole alienaria</i> (Herrich-Schäffer)	230	84	314	793	912	1,705	2,019	14	6 May-17 Jul
<i>Probole amicularia</i> (Herrich-Schäffer)	11	44	55	84	30	114	169	105	22 May-12 Aug
<i>Prochoerodes transversata</i> (Drury)	21	29	50	13	38	51	101	127	3 Jul-14 Aug
<i>Protoarmia porcelaria</i> (Guenée)	4	1	5	0	0	0	5	201	6 May-12 Jun
<i>Scopula inductata</i> (Guenée)	26	3	29	12	3	15	44	164	22 May-14 Aug
<i>Scopula limboundata</i> (Haworth)	64	127	191	71	169	240	431	63	29 May-14 Aug
<i>Selenia kentaria</i> (Grote & Robinson)	0	0	0	1	1	2	2	204	20 May-24 Jul
<i>Semiothisa aemulataria</i> (Walker)	44	82	126	39	114	153	279	80	6 May-14 Aug
<i>Semiothisa bicolorata</i> (F.)	58	0	58	39	0	39	97	129	22 May-14 Aug
<i>Semiothisa bisignata</i> (Walker)	356	604	960	193	220	413	1,373	20	6 May-12 Aug
<i>Semiothisa distribuaria</i> (Hübner)	11	28	39	1	0	1	40	168	15 May-14 Aug
<i>Semiothisa fassinotata</i> (Walker)	53	111	164	222	205	427	591	48	6 May-14 Aug
<i>Semiothisa granitata</i> (Guenée)	322	79	401	39	13	52	453	58	6 May-31 Jul
<i>Semiothisa minorata</i> (Packard)	254	488	742	93	172	265	1,007	29	6 May-14 Aug
<i>Semiothisa ocellinata</i> (Guenée)	50	77	127	85	161	246	373	70	6 May-14 Aug
<i>Semiothisa ulsterata</i> (Pearsall)	1	0	1	3	0	3	4	202	22 May-14 Aug
<i>Sicya macularia</i> (Harris)	7	5	12	4	3	7	19	187	17 Jun-10 Jul
<i>Tetracis cachexiata</i> Guenée	35	44	79	166	131	297	376	69	15 May-8 Jul
<i>Tetracis crocallata</i> Guenée	0	1	1	2	0	2	3	203	19 Jun-26 Jun
<i>Trichodezia albovittata</i> (Guenée)	0	0	0	2	0	2	2	204	31 Jul-7 Aug
<i>Xanthorhoe ferrugata</i> (Clerck)	0	0	0	0	1	1	1	205	20 May
<i>Xanthorhoe labradorensis</i> (Packard)	0	0	0	3	0	3	3	203	22 May-7 Aug
<i>Xanthorhoe lacustrata</i> (Guenée)	0	0	0	0	1	1	1	205	20 May
<i>Xanthotype sospeta</i> (Drury)	3	5	8	14	21	35	43	165	17 Jun-14 Aug
Lasiocampidae									
<i>Malacosoma americanum</i> (F.)	237	111	348	124	117	241	589	49	5 Jun-24 Jul
<i>Malacosoma disstria</i> Hübner	207	168	375	154	148	302	677	43	17 Jun-31 Jul
<i>Phylodesma americana</i> (Harris)	6	64	70	9	23	32	102	126	6 May-15 Jul
<i>Tolyte notialis</i> Franclemont	22	8	30	1	1	2	32	175	15 Jul-14 Aug

Table 1. Continued.

Family Species	GWNF		MNF		Grand Total	Rank	Flight Period		
	1995	1996	Total	1995				1996	Total
<b>Lymantriidae</b>									
<i>Dasychira</i> spp.	66	50	116	115	142	257	373	70	17 Jun-14 Aug
<i>Lymantria dispar</i> (L.)	39	6	45	24	16	40	85	136	26 Jun-12 Aug
<i>Orgyia leucostigma</i> (J.E. Smith)	5	5	10	2	4	6	16	190	24 Jun-14 Aug
<b>Mimallonidae</b>									
<i>Cicinnus melsheimeri</i> (Harris)	2	10	12	20	28	48	60	151	5 Jun-26 Jun
<i>Lacosoma chiridota</i> Grote	1	1	2	0	1	1	3	203	29 May-17 Jun
<b>Noctuidae</b>									
<i>Abagrotis alternata</i> (Grote)	15	5	20	15	3	18	38	170	26 Jun-14 Aug
<i>Achatia distincta</i> Hübner	27	6	33	20	32	52	85	136	6 May-29 May
<i>Achatodes zaeae</i> (Harris)	0	0	0	0	1	1	1	205	22 Jul
<i>Acronicta afflicta</i> Grote	137	76	213	4	7	11	224	92	6 May-14 Aug
<i>Acronicta americana</i> (Harris)	25	16	41	28	18	46	87	134	6 May-5 Aug
<i>Acronicta fragilis</i> Guenée	1	0	1	45	13	58	59	152	22 May-5 Aug
<i>Acronicta haesitata</i> (Grote)	805	421	1,226	627	858	1,485	2,711	12	20 May-14 Aug
<i>Acronicta hamamelis</i> Guenée	2	14	16	2	4	6	22	184	20 May-5 Aug
<i>Acronicta hasta</i> Guenée	11	7	18	5	24	29	47	161	6 May-7 Aug
<i>Acronicta impleta</i> Walker	50	1	51	2	0	2	53	156	22 May-31 Jul
<i>Acronicta increta</i> Morrison	832	838	1,670	529	921	1,450	3,120	11	20 May-14 Aug
<i>Acronicta innotata</i> Guenée	0	2	2	80	65	145	147	113	8 May-12 Aug
<i>Acronicta laetifica</i> J.B. Smith	1	0	1	1	0	1	2	204	8 May-26 Jun
<i>Acronicta lithospila</i> Grote	12	6	18	0	1	1	19	187	8 May-12 Aug
<i>Acronicta lobeliae</i> Guenée	23	5	28	7	7	14	42	166	6 May-15 Jul
<i>Acronicta modica</i> Walker	272	113	385	214	182	396	781	40	15 May-7 Aug
<i>Acronicta morula</i> Grote & Robinson	5	10	15	26	41	67	82	137	20 May-14 Aug
<i>Acronicta ovata</i> Grote	2,187	1,955	4,142	2,386	7,481	9,867	14,009	1	20 May-14 Aug
<i>Acronicta pruni</i> Harris	2	7	9	3	3	6	15	191	6 May-12 Aug
<i>Acronicta radcliffei</i> (Harvey)	0	0	0	0	2	2	2	204	24 Jun-8 Jul
<i>Acronicta retardata</i> (Walker)	2	5	7	0	5	5	12	194	22 May-5 Aug
<i>Acronicta spinigera</i> Guenée	0	0	0	4	5	9	9	197	15 May-10 Jun
<i>Acronicta superans</i> Guenée	0	0	0	1	0	1	1	205	3 Jul
<i>Acronicta tristis</i> J.B. Smith	46	0	46	3	0	3	49	159	15 May-5 Jun
<i>Acronicta tritona</i> (Hübner)	0	2	2	0	0	0	2	204	20 May-12 Aug

Table 1. Continued.

Family Species	GWNF		MINF			Grand Total	Rank	Flight Period	
	1995	1996	Total	1995	1996				Total
<i>Agriopodes fallax</i> (Herrich-Schäffer)	2	7	9	0	1	10	196	20 May-31 Jul	
<i>Agriopodes teratophora</i> (Herrich-Schäffer)	2	4	6	5	6	11	189	22 May-5 Aug	
<i>Agroperina dubitans</i> (Walker)	0	0	0	3	0	3	203	31 Jul-14 Aug	
<i>Agrotis ipsilon</i> (Hufnagel)	8	5	13	1	6	20	186	15 May-14 Aug	
<i>Allagrapha aerea</i> (Hübner)	2	1	3	1	3	4	199	19 Jun-5 Aug	
<i>Allotria elonympha</i> (Hübner)	156	174	330	2	4	336	73	6 May-14 Aug	
<i>Amphipoea americana</i> (Speyer)	1	0	1	1	1	2	203	17 Jul-29 Jul	
<i>Amphipoea velata</i> (Walker)	2	0	2	2	0	4	202	3 Jul-24 Jul	
<i>Amphipyra pyramidoidea</i> Guenée	3	0	3	3	5	11	195	31 Jul-12 Aug	
<i>Anagrapha falcifera</i> (W.F. Kirby)	1	0	1	1	1	3	203	20 May-26 Jun	
<i>Anathix ralla</i> (Grote & Robinson)	3	0	3	2	0	5	201	14 Aug	
<i>Anomogyna badicollis</i> (Grote)	43	45	88	162	184	434	62	17 Jun-14 Aug	
<i>Anorthodes tarda</i> (Guenée)	915	302	1,217	226	63	289	19	6 May-14 Aug	
<i>Apamea vulgaris</i> (Grote & Robinson)	0	0	0	1	0	1	205	24 Jul	
<i>Autographa precatationis</i> (Guenée)	5	4	9	3	1	13	193	22 May-17 Jul	
<i>Baileya dormitans</i> (Guenée)	27	15	42	34	33	67	124	6 May-14 Aug	
<i>Baileya levitans</i> (J.B. Smith)	50	128	178	8	73	259	84	6 May-29 Jul	
<i>Baileya ophthalmica</i> (Guenée)	93	59	152	163	182	497	55	6 May-5 Aug	
<i>Balsa labecula</i> (Grote)	204	144	348	485	221	706	27	8 May-14 Aug	
<i>Balsa malana</i> (Fitch)	0	16	16	0	4	20	186	6 May	
<i>Bleptina caradrinalis</i> Guenée	152	171	323	71	26	97	64	29 May-12 Aug	
<i>Bomolocha abalienalis</i> (Walker)	1	0	1	0	1	2	204	5 Jun-17 Jun	
<i>Bomolocha baltimoralis</i> (Guenée)	49	38	87	178	191	456	57	6 May-14 Aug	
<i>Bomolocha deceptalis</i> (Walker)	1	6	7	10	14	24	176	6 May-14 Aug	
<i>Bomolocha edictalis</i> (Walker)	21	3	24	42	5	71	143	3 Jul-14 Aug	
<i>Bomolocha palparia</i> (Walker)	0	21	21	2	22	45	163	20 May-12 Aug	
<i>Caenurgina erechtea</i> (Cramer)	0	1	1	2	3	6	200	17 Jun-12 Aug	
<i>Callopietria cordata</i> (Ljungh)	9	4	13	5	5	23	183	5 Jun-17 Jul	
<i>Callopietria mollissima</i> (Guenée)	5	7	12	101	100	201	94	20 May-14 Aug	
<i>Catocala amica</i> (Hübner)	357	74	431	14	2	447	60	10 Jul-14 Aug	
<i>Catocala andromedae</i> Guenée	143	23	166	30	11	207	95	3 Jul-14 Aug	
<i>Catocala blandula</i> Hulst	0	0	0	1	0	1	205	3 Jul	
<i>Catocala coccinata</i> Grote	24	10	34	2	1	37	171	26 Jun-5 Aug	
<i>Catocala connubialis</i> Guenée	8	0	8	0	1	9	197	3 Jul-15 Jul	

Table 1. Continued.

Family Species	GWNF		MNF		Grand Total	Rank	Flight Period	
	1995	1996	Total	1996				Total
<i>Catocala dejecta</i> Strecker	26	7	33	1	2	172	17 Jul-14 Aug	
<i>Catocala epione</i> (Drury)	138	38	176	0	2	101	26 Jun-14 Aug	
<i>Catocala flebilis</i> Grote	19	0	19	0	0	187	24 Jul-31 Jul	
<i>Catocala grynea</i> (Cramer)	2	0	2	0	0	204	17 Jul-24 Jul	
<i>Catocala ilia</i> (Cramer)	4	2	6	3	8	192	8 Jul-14 Aug	
<i>Catocala micronympha</i> Guenée	379	149	528	73	123	45	26 Jun-14 Aug	
<i>Catocala palaeogama</i> Guenée	8	1	9	2	3	194	17 Jul-14 Aug	
<i>Catocala similis</i> W.H. Edwards	47	8	55	0	0	155	26 Jun-15 Jul	
<i>Catocala sordida</i> Grote	153	89	242	19	25	83	24 Jun-14 Aug	
<i>Catocala ultronia</i> (Hübner)	2	0	2	0	2	202	22 Jul-14 Aug	
<i>Cerastis tenebrifera</i> (Walker)	0	0	0	1	5	201	6 May-8 May	
<i>Cerma cerintha</i> (Treitschke)	14	12	26	9	26	157	10 Jun-5 Aug	
<i>Cerma cora</i> Hübner	1	0	1	4	7	198	8 May-5 Jun	
<i>Charadra deridens</i> (Guenée)	11	51	62	13	90	111	6 May-14 Aug	
<i>Chrysanympha formosa</i> (Grote)	4	9	13	16	21	173	10 Jun-31 Jul	
<i>Chytolita morbidalis</i> (Guenée)	110	55	165	768	1,153	22	20 May-10 Jul	
<i>Chytonix palliatricula</i> (Guenée)	194	77	271	60	135	65	8 May-14 Aug	
<i>Cissusa spadix</i> (Cramer)	1	6	7	30	50	153	6 May-29 May	
<i>Colocasia propinquilinea</i> (Grote)	72	19	91	35	90	100	6 May-5 Aug	
<i>Copivaleria grotei</i> (Morrison)	0	0	0	2	4	202	6 May-20 May	
<i>Cosmia calami</i> (Harvey)	165	102	267	81	128	67	26 Jun-14 Aug	
<i>Crambodes talidiformis</i> (Guenée)	1	1	2	0	1	203	20 May-3 Jul	
<i>Crocigrapha normani</i> (Grote)	13	3	16	54	79	131	6 May-29 May	
<i>Diarsia jucunda</i> (Walker)	0	0	0	4	7	199	10 Jul-29 Jul	
<i>Egira alternans</i> (Walker)	6	9	15	0	5	186	6 May-20 May	
<i>Elaphria festivoidea</i> (Guenée)	609	218	827	205	432	24	6 May-14 Aug	
<i>Elaphria georgei</i> (Moore & Rawson)	22	32	54	10	13	146	6 May-3 Jul	
<i>Elaphria grata</i> Hübner	1	4	5	0	0	201	8 Jul-12 Aug	
<i>Elaphria versicolor</i> (Grote)	15	25	40	27	64	125	8 May-14 Aug	
<i>Euagrotis illapsa</i> (Walker)	0	1	1	1	2	203	17 Jun-5 Aug	
<i>Euclidia cuspidata</i> (Hübner)	4	5	9	0	1	196	6 May-31 Jul	
<i>Eudryas grata</i> (F.)	38	30	68	8	25	132	19 Jun-5 Aug	
<i>Eueretagtrotis perattenta</i> (Grote)	0	0	0	0	4	202	1 Jul-15 Jul	
<i>Euparthenos nubilus</i> (Hübner)	39	17	56	72	131	98	8 May-12 Aug	
<i>Euplexia benesimilis</i> McDunnough	5	9	14	17	48	150	20 May-14 Aug	

Table 1. Continued.

Family Species	GWNF		MNF		Grand Total	Rank	Flight Period		
	1995	1996	Total	1995				1996	Total
<i>Eutolype electilis</i> (Morrison)	0	0	0	0	1	205	6 May		
<i>Feltia herilis</i> (Grote)	4	0	4	0	1	201	29 Jul-14 Aug		
<i>Feralia comstocki</i> (Grote)	0	1	1	6	19	186	6 May-19 Jun		
<i>Galgula partita</i> (Guenée)	1	3	4	0	1	201	3 Jun-15 Jul		
<i>Heptagrotis phyllophora</i> (Grote)	6	2	8	7	15	183	26 Jun-24 Jul		
<i>Homohadena infixa</i> (Walker)	1	2	3	0	1	202	17 Jun-22 Jul		
<i>Homorthodes furfurata</i> (Grote)	227	50	277	27	18	75	6 May-14 Aug		
<i>Hypena humuli</i> Harris	4	0	4	7	0	195	8 May-14 Aug		
<i>Hypenula cacuminalis</i> (Walker)	1	0	1	0	0	205	22 May		
<i>Hyperstrotia pervertens</i> (Barnes & McDunnough)	66	193	259	100	882	25	20 May-14 Aug		
<i>Hyperstrotia secta</i> (Grote)	0	0	0	0	2	204	15 Jul		
<i>Hyppa xylinoides</i> (Guenée)	0	0	0	2	4	200	10 Jun-14 Aug		
<i>Hypsoropha hormos</i> Hübner	4	3	7	0	0	199	29 May-5 Aug		
<i>Idia aemula</i> Hübner	2,900	1,232	4,132	850	598	4	20 May-14 Aug		
<i>Idia americana</i> (Guenée)	225	100	325	219	287	36	8 May-14 Aug		
<i>Idia diminuendis</i> (Barnes & McDunnough)	62	13	75	45	1	121	19 Jun-14 Aug		
<i>Idia forbesi</i> (French)	1	0	1	1	0	204	3 Jul-17 Jul		
<i>Idia lubricalis</i> (Geyer)	8	4	12	19	21	157	26 Jun-14 Aug		
<i>Idia rotundalis</i> (Walker)	2,096	1,023	3,119	2,757	2,588	2	10 Jun-14 Aug		
<i>Idia scobialis</i> (Grote)	14	0	14	45	0	152	26 Jun-14 Aug		
<i>Lacanobia grandis</i> (Guenée)	0	1	1	0	1	204	20 May-17 Jun		
<i>Lacanobia legitima</i> (Grote)	0	0	0	6	0	200	19 Jun-14 Aug		
<i>Lacanobia lutra</i> (Guenée)	5	7	12	0	4	190	20 May-5 Aug		
<i>Lacinipolia anguina</i> (Grote)	41	18	59	14	3	139	6 May-3 Jun		
<i>Lacinipolia olivacea</i> (Morrison)	0	0	0	23	2	181	24 Jul-14 Aug		
<i>Lacinipolia renigera</i> (Stephens)	29	1	30	45	16	133	22 May-14 Aug		
<i>Leucania linda</i> Franclemont	1	16	17	0	1	188	29 May-1 Jul		
<i>Leucania pseudargyria</i> Guenée	0	1	1	0	5	200	24 Jun-22 Jul		
<i>Leucania ursula</i> (W.T.M. Forbes)	1	0	1	1	0	204	15 May-14 Aug		
<i>Leuconycta diptheroides</i> (Guenée)	3	1	4	5	8	189	29 May-5 Aug		
<i>Leuconycta lepidula</i> (Grote)	2	0	2	0	0	204	5 Jun-31 Jul		
<i>Lithacodia carneola</i> (Guenée)	33	32	65	35	32	115	20 May-14 Aug		
<i>Lithacodia concinnimacula</i> (Guenée)	0	0	0	14	7	185	29 May-19 Jun		
<i>Lithacodia muscosula</i> (Guenée)	2	9	11	73	200	79	20 May-14 Aug		
<i>Lithacodia synochitis</i> (Grote & Robinson)	4	16	20	15	13	160	20 May-31 Jul		

Table 1. Continued.

Family Species	GWNF			MNF			Grand Total	Rank	Flight Period
	1995	1996	Total	1995	1996	Total			
	<i>Lithophane antennata</i> (Walker)	0	0	0	1	0			
<i>Lithophane hemina</i> Grote	0	0	0	1	0	1	1	205	22 May
<i>Lithophane innominata</i> (J.B. Smith)	0	0	0	4	10	14	14	192	6 May-29 May
<i>Meganola minuscula</i> (Zeller)	251	130	381	212	310	522	903	34	6 May-14 Aug
<i>Meganola spodia</i> Franclemont	1	3	4	0	23	23	27	179	20 May-22 Jul
<i>Melanchra adjuncta</i> (Guenée)	2	3	5	1	0	1	6	200	29 May-5 Aug
<i>Metalectra discalis</i> (Grote)	3	0	3	0	2	2	5	201	5 Jun-31 Jul
<i>Morrisonia confusa</i> (Hübner)	58	91	149	252	101	353	502	54	6 May-5 Jun
<i>Morrisonia evicta</i> (Grote)	50	8	58	9	6	15	73	141	6 May-29 May
<i>Nedra ramosula</i> (Guenée)	1	0	1	1	0	1	2	204	31 Jul
<i>Nola pustulata</i> (Walker)	0	0	0	2	0	2	2	204	19 Jun
<i>Nola triquetra</i> (Fitch)	11	0	11	23	5	28	39	169	6 May-8 May
<i>Ochropleura plecta</i> (L.)	0	2	2	0	3	3	5	201	20 May-5 Aug
<i>Ogdoconta cinereola</i> (Guenée)	0	3	3	0	1	1	4	202	5 Aug
<i>Oligia bridghami</i> (Grote & Robinson)	0	0	0	0	1	1	1	205	8 Jul
<i>Oligia fractilinea</i> (Grote)	1	0	1	0	0	0	1	205	14 Aug
<i>Orthodes cynica</i> (Guenée)	9	3	12	142	178	320	332	74	15 May-5 Aug
<i>Orthosia revicta</i> (Morrison)	1	0	1	1	0	1	2	204	8 May
<i>Orthosia rubescens</i> (Walker)	23	9	32	18	41	59	91	133	6 May-20 May
<i>Oruza albocostaliata</i> (Packard)	2	4	6	1	0	1	7	199	26 Jun-29 Jul
<i>Paectes oculatrix</i> (Guenée)	2	0	2	0	0	0	2	204	19 Jun-24 Jul
<i>Paectes pygmaea</i> Hübner	0	6	6	0	1	1	7	199	17 Jun-5 Aug
<i>Palthis angulalis</i> (Hübner)	25	23	48	28	10	38	86	135	20 May-14 Aug
<i>Palthis asopialis</i> (Guenée)	1	0	1	0	0	0	1	205	29 May
<i>Pangrapta decoralis</i> Hübner	201	46	247	95	57	152	399	66	6 May-14 Aug
<i>Panopoda carneicosta</i> Guenée	47	53	100	19	43	62	162	107	29 May-14 Aug
<i>Panopoda rufimargo</i> (Hübner)	67	77	144	39	57	96	240	89	5 Jun-14 Aug
<i>Panthea acronyctoides</i> (Walker)	2	5	7	10	24	34	41	167	3 Jul-5 Aug
<i>Panthea furcilla</i> (Packard)	25	14	39	3	8	11	50	158	6 May-14 Aug
<i>Parallela bistriaris</i> Hübner	21	7	28	106	38	144	172	103	8 May-14 Aug
<i>Peridroma saucia</i> (Hübner)	0	0	0	1	0	1	1	205	10 Jul
<i>Perigea xanthioides</i> Guenée	1	0	1	0	1	1	2	204	22 May-22 Jul
<i>Phalaenophana pyramusalis</i> (Walker)	0	1	1	0	1	1	2	204	20 May-10 Jun
<i>Phalaenostola larentioides</i> Grote	1	0	1	0	2	2	3	203	17 Jun-19 Jun
<i>Phlogophora iris</i> Guenée	0	0	0	7	7	14	14	192	3 Jun-3 Jul

Table 1. Continued.

Family Species	GWNF			MNF			Grand Total	Rank	Flight Period	
	1995		Total	1995		1996				Total
	1995	1996	1995	1996	1995	1996				Total
<i>Phoberia atomaris</i> Hübner	1	3	4	7	85	92	96	130	6 May-20 May	
<i>Phosphila miseloides</i> (Guenée)	6	13	19	1	2	3	22	184	20 May-14 Aug	
<i>Phosphila turbulenta</i> Hübner	0	2	2	3	0	3	5	201	26 Jun-8 Jul	
<i>Phyrosopus callitrichoides</i> Grote	0	1	1	0	0	0	1	205	5 Aug	
<i>Plathypena scabra</i> (F.)	1	5	6	2	5	7	13	193	22 May-14 Aug	
<i>Platysenta vecors</i> (Guenée)	10	26	36	24	39	63	99	128	6 May-12 Aug	
<i>Polia detracta</i> (Walker)	259	288	547	192	229	421	968	31	20 May-5 Aug	
<i>Polia goodelli</i> (Grote)	1	0	1	0	0	0	1	205	5 Jun	
<i>Polia imbrifera</i> (Guenée)	0	0	0	7	0	7	7	199	3 Jul-10 Jul	
<i>Polia latex</i> (Guenée)	52	117	169	137	150	287	456	57	15 May-5 Aug	
<i>Polia nimbose</i> (Guenée)	0	0	0	68	56	124	124	118	8 Jul-5 Aug	
<i>Polychrysis morigera</i> (Henry Edwards)	0	0	0	0	1	1	1	205	5 Aug	
<i>Polygrammate hebraeicum</i> Hübner	2,527	1,714	4,241	255	414	669	4,910	5	15 May-14 Aug	
<i>Protolampra brunneicollis</i> (Grote)	6	24	30	1	8	9	39	169	17 Jun-14 Aug	
<i>Protorthodes oviduca</i> (Guenée)	4	3	7	0	1	1	8	198	6 May-22 May	
<i>Psaphida resumens</i> Walker	0	0	0	0	6	6	6	200	6 May	
<i>Pseudaletia unipuncta</i> (Haworth)	11	9	20	8	7	15	35	172	20 May-14 Aug	
<i>Pseudorthodes vecors</i> (Guenée)	0	0	0	0	19	19	19	187	15 Jul-5 Aug	
<i>Pyreferra hesperidago</i> (Guenée)	0	1	1	4	6	10	11	195	6 May-15 May	
<i>Pyrrhia exprimens</i> (Walker)	0	0	0	5	0	5	5	201	19 Jun-24 Jul	
<i>Raphia frater</i> Grote	0	2	2	0	1	1	3	203	17 Jun-1 Jul	
<i>Renia discoloralis</i> Guenée	15	14	29	17	13	30	59	152	1 Jul-14 Aug	
<i>Renia factiosalis</i> (Walker)	0	13	13	2	18	20	33	174	20 May-14 Aug	
<i>Renia fraternalis</i> J.B. Smith	1	0	1	0	0	0	1	205	24 Jul	
<i>Renia sobrialis</i> (Walker)	3	0	3	41	0	41	44	164	7 Aug-14 Aug	
<i>Rhynchagrotis cupida</i> (Grote)	0	0	0	2	1	3	3	203	10 Jul-5 Aug	
<i>Schinia rivulosa</i> (Guenée)	2	0	2	0	0	0	2	204	14 Aug	
<i>Sideridis congermana</i> (Morrison)	1	0	1	0	0	0	1	205	22 May	
<i>Spaelotis clandestina</i> (Harris)	59	25	84	68	22	90	174	102	29 May-14 Aug	
<i>Spodoptera ornithogalli</i> (Guenée)	2	0	2	0	0	0	2	204	29 May-24 Jul	
<i>Synedoida grandirena</i> (Haworth)	3	2	5	3	2	5	10	196	22 May-22 Jul	
<i>Syngrapha rectangula</i> (W.F. Kirby)	3	0	3	0	0	0	3	203	31 Jul-7 Aug	
<i>Tarachidia candefacta</i> (Hübner)	0	1	1	0	0	0	1	205	8 Jul	
<i>Tarachidia erastrioides</i> (Guenée)	1	1	2	1	0	1	3	203	29 May-29 Jul	
<i>Thioptera nigrofimbria</i> (Guenée)	13	11	24	1	7	8	32	175	5 Jun-14 Aug	



Table 1. Continued.

Family Species	GWNF			MNF			Grand Total	Rank	Flight Period
	1995	1996	Total	1995	1996	Total			
<i>Tricholita signata</i> (Walker)	0	2	2	6	2	8	10	196	17 Jun-14 Aug
<i>Ulolonche culea</i> (Guenée)	59	46	105	42	10	52	157	110	6 May-19 Jun
<i>Xestia badinodis</i> (Grote)	0	0	0	2	1	3	3	203	31 Jul-14 Aug
<i>Xestia dolosa</i> Franclemont	17	18	35	25	39	64	99	128	8 May-14 Aug
<i>Xestia normaniana</i> (Grote)	0	0	0	2	0	2	2	204	7 Aug-14 Aug
<i>Zale bethunei</i> (J.B. Smith)	2	2	4	0	0	0	4	202	8 May-8 Jul
<i>Zale duplicata</i> (Bethune)	6	4	10	6	5	11	21	185	6 May-17 Jul
<i>Zale helata</i> (J.B. Smith)	63	129	192	5	26	31	223	93	6 May-14 Aug
<i>Zale lunifera</i> (Hübner)	2	8	10	0	6	6	16	190	6 May-8 May
<i>Zale minerea</i> (Guenée)	162	67	229	208	133	341	570	50	6 May-5 Aug
<i>Zale obliqua</i> (Guenée)	8	0	8	0	1	1	9	197	8 May-8 Jul
<i>Zale phaeocapna</i> Franclemont	0	1	1	1	11	12	13	193	6 May-3 Jun
<i>Zale squamularis</i> (Drury)	1	0	1	0	0	0	1	205	8 May
<i>Zale submediana</i> (Strand)	2	0	2	1	0	1	3	203	15 May-22 May
<i>Zale undularis</i> (Drury)	1	1	2	2	0	2	4	202	29 May-22 Jul
<i>Zale unilineata</i> (Grote)	62	43	105	162	55	217	322	75	6 May-19 Jun
<i>Zanclognatha cruralis</i> (Guenée)	28	6	34	56	25	81	115	123	12 Jun-31 Jul
<i>Zanclognatha inconspicualis</i> (Grote)	0	0	0	0	7	7	7	199	29 Jul-5 Aug
<i>Zanclognatha jacchusalis</i> (Walker)	25	10	35	56	2	58	93	132	3 Jun-31 Jul
<i>Zanclognatha laevigata</i> (Grote)	218	17	235	634	207	841	1,076	26	3 Jul-14 Aug
<i>Zanclognatha lituralis</i> (Hübner)	1	11	12	46	41	87	99	128	3 Jun-5 Aug
<i>Zanclognatha martha</i> Barnes	26	31	57	4	9	13	70	144	24 Jun-5 Aug
<i>Zanclognatha ochreipennis</i> (Grote)	114	94	208	207	216	423	631	46	3 Jul-14 Aug
Notodontidae									
<i>Clostera albosigma</i> Fitch	0	0	0	1	0	1	1	205	24 Jul
<i>Dasylophia anguina</i> (J.E. Smith)	5	12	17	3	7	10	27	179	22 May-5 Aug
<i>Datana angusii</i> Grote & Robinson	6	15	21	1	8	9	30	177	3 Jun-31 Jul
<i>Datana ministra</i> (Drury)	36	102	138	7	16	23	161	108	22 May-7 Aug
<i>Ellida caniplaga</i> (Walker)	1	5	6	9	11	20	26	180	6 May-5 Aug
<i>Furcula borealis</i> (Guérin-Méneville)	0	0	0	2	1	3	3	203	20 May-24 Jul
<i>Gluphisia septentrionis</i> Walker	0	1	1	0	1	1	2	204	10 Jun-5 Aug
<i>Heterocampa biundata</i> Walker	13	4	17	68	83	151	168	106	22 May-14 Aug
<i>Heterocampa guttivitta</i> (Walker)	296	342	638	336	324	660	1,298	23	6 May-5 Aug
<i>Heterocampa obliqua</i> Packard	92	110	202	33	49	82	284	79	19 Jun-12 Aug

Table 1. Continued.

Family Species	GWNF			MNF			Grand Total	Rank	Flight Period
	1995	1996	Total	1995	1996	Total			
	<i>Heterocampa umbrata</i> Walker	321	104	425	15	80			
<i>Hyparpax aurora</i> (J.E. Smith)	0	1	1	0	0	0	1	205	22 Jul
<i>Hyperaeschra georgica</i> (Herrich-Schäffer)	242	187	429	157	87	244	673	44	6 May-7 Aug
<i>Lochmaeus manteo</i> Doubleday	21	4	25	24	37	61	86	135	20 May-12 Aug
<i>Macriurocampa marthesia</i> (Cramer)	226	58	284	310	119	429	713	42	19 Jun-14 Aug
<i>Nadata gibbosa</i> (J.E. Smith)	677	299	976	517	298	815	1,791	16	6 May-14 Aug
<i>Nerice bidentata</i> Walker	0	0	0	1	0	1	1	205	29 May
<i>Oligocentria lignicolor</i> (Walker)	23	0	23	92	3	95	118	122	19 Jun-14 Aug
<i>Oligocentria semirufescens</i> (Walker)	12	3	15	83	34	117	132	115	19 Jun-12 Aug
<i>Peridea angulosa</i> (J.E. Smith)	434	255	689	623	305	928	1,617	17	17 Jun-14 Aug
<i>Peridea basitriens</i> (Walker)	9	3	12	104	42	146	158	109	22 May-7 Aug
<i>Peridea ferruginea</i> (Packard)	0	0	0	12	3	15	15	191	19 Jun-5 Aug
<i>Schizura ipomoeae</i> Doubleday	8	4	12	29	35	64	76	139	19 Jun-14 Aug
<i>Schizura leptinoides</i> (Grote)	19	22	41	73	80	153	194	97	22 May-14 Aug
<i>Schizura unicornis</i> (J.E. Smith)	0	0	0	1	0	1	1	205	14 Aug
<i>Symmerista canicosta</i> Franclemont	36	8	44	795	528	1,323	1,367	21	27 May-7 Aug
<i>Symmerista leucitys</i> Franclemont	26	72	98	160	118	278	376	69	29 May-12 Aug
Saturniidae									
<i>Actias luna</i> (L.)	52	42	94	25	15	40	134	114	6 May-7 Aug
<i>Anisota stigma</i> (F.)	17	55	72	0	0	0	72	142	24 Jun-31 Jul
<i>Anisota virginensis</i> (Drury)	2	1	3	0	0	0	3	203	24 Jun-10 Jul
<i>Antheraea polyphemus</i> (Cramer)	91	6	97	23	5	28	125	117	15 May-5 Aug
<i>Automeris io</i> (F.)	4	4	8	1	2	3	11	195	29 May-8 Jul
<i>Callosamia angulifera</i> (Walker)	4	3	7	0	0	0	7	199	15 May-8 Jul
<i>Callosamia promethea</i> (Drury)	1	0	1	0	0	0	1	205	8 May
<i>Dryocampa rubicunda</i> (F.)	161	166	327	261	280	541	868	35	15 May-5 Aug
<i>Eacles imperialis</i> (Drury)	43	22	65	0	0	0	65	147	3 Jul-31 Jul
Sphingidae									
<i>Ceratomia undulosa</i> (Walker)	2	0	2	11	5	16	18	188	20 May-14 Aug
<i>Darapsa myron</i> (Cramer)	5	3	8	1	1	2	10	196	10 Jun-31 Jul
<i>Darapsa pholus</i> (Cramer)	10	10	20	0	1	1	21	185	6 May-7 Aug
<i>Deidamia inscripta</i> (Harris)	21	15	36	2	1	3	39	169	6 May-29 May
<i>Eumorpha pandorus</i> (Hübner)	1	0	1	0	0	0	1	205	31 Jul

Table 1. Continued.

Family Species	GWNF		MNF		Grand Total	Rank	Flight Period
	1995	Total	1995	1996			
				Total			
<i>Laothoe juglandis</i> (J.E. Smith)	9	21	16	6	43	165	20 May-5 Aug
<i>Lapara coniferarum</i> (J.E. Smith)	143	348	42	62	452	59	20 May-12 Aug
<i>Paonias excaecatus</i> (J.E. Smith)	46	84	113	35	232	91	29 May-12 Aug
<i>Paonias myops</i> (J.E. Smith)	2	4	26	8	38	170	22 May-12 Aug
<i>Sphinx gordius</i> Cramer	2	2	0	0	2	204	8 May-22 May
<b>Thyatiridae</b>							
<i>Euthyatira pudens</i> (Guenée)	13	14	12	1	27	179	6 May-29 May
<i>Habrosyne scripta</i> (Gosse)	0	0	1	0	1	205	19 Jun
<i>Pseudothyatira cymatophoroides</i> (Guenée)	2	3	9	11	23	183	29 May-12 Aug
<b>Totals</b>	<b>35,745</b>	<b>60,609</b>	<b>35,593</b>	<b>39,069</b>	<b>135,271</b>		

Table 2. Temperature and rainfall measurements from May through August, 1995 and 1996 for the GWNF and the MNF.

Year	Forest	Temperature (°C)		Rainfall (cm)
		Av. Low	Av. High	
1995	GWNF	16.8	28.5	21.8
	MNF	13.9	23.8	16.8
1996	GWNF	12.0	27.1	39.1
	MNF	10.0	24.4	49.3

(Walker); the notodontid *Peridea ferruginea* (Packard); and the noctuids *Lithacodia concinnimacula* (Guenée), *Phlogophora iris* Guenée, *Lithophane innominata* (Smith), *Polia nimbosa* Guenée, *Lacinipolia olivacea* (Morrison), and *Pseudoorthodes vecors* (Guenée).

Temperature and rainfall recorded over a 30-year period (1961–1990) at NOAA stations near our plots indicate annual maximum temperatures are higher in the GWNF (17.8°C) than the MNF (16.4°C) and median annual rainfall is lower in the GWNF (96.8 cm) than the MNF (125.5 cm) (Owenby and Ezell 1992). During our current study, average low and high temperatures were higher in the GWNF than the MNF for both years (Table 2). In 1995, total rainfall recorded in our plots from May through August was higher in the GWNF than the MNF. Most of that rain fell during one large storm event in the GWNF in early June 1995. The 1996 rainfall was higher in the MNF than the GWNF, thus being more typical of the 30-year trend.

No clear trend in lepidopteran abundance was seen between the two years of the study. Higher overall abundance was collected in 1995 (71,336), the warmer, drier year (Table 1). The difference between years for the GWNF was considerable with 51% higher abundance of moths trapped in 1995. For the MNF, the reverse occurred with the abundance in 1996 being 9% higher than in 1995. Several of the more abundant species showed a notable shift in abundance between the two years.

The mean basal area contributed by dom-

Table 3. Abundance of major tree groups as indicated by mean basal areas for the GWNF and the MNF. Range and standard error are given.

Tree	GNWF			MNF		
	Mean	Range	SE	Mean	Range	SE
<i>Acer</i> spp.	0.52	0.08–0.90	0.21	2.70	0.55–8.16	0.56
<i>Carya</i> spp.	1.13	0.74–2.05	0.47	2.48	0.66–6.31	0.63
<i>Pinus</i> spp.	4.98	0.90–10.16	0.99	2.77	0.0–8.44	0.56
<i>Q. alba</i>	0.78	0.0–1.64	0.28	3.41	0.33–7.95	0.61
<i>Q. prinus</i>	6.45	2.46–10.25	1.00	3.85	0.74–7.29	0.87
<i>Q. (Erythrobalanus)</i>	6.37	5.33–8.44	0.94	4.45	1.97–8.44	0.81
Other	1.08	0.25–1.97	0.42	2.78	0.74–5.49	0.76

inant tree species including the host species emphasized in our study is given in Table 3. Basal areas of hickories, maples, white oak, and other species, were higher in the MNF while basal areas of chestnut oak, red oaks (subgenus *Erythrobalanus* spp.), and pines were higher in the GWNF. The higher composition of red oak/pine in the GWNF is indicative of more xeric conditions. The mean basal area represented by "other species" on our plots was 61% higher in the MNF than the GWNF, indicating an overall greater diversity in species composition of woody vegetation. Included in the "other" category in the MNF were black (*Betula lenta* L.) and yellow birch (*B. alleghaniensis* Britt.), black cherry (*Prunus serotina* Ehrh.), choke cherry (*P. virginiana* L.), blackgum (*Nyssa sylvatica* Marsh.), black locust (*Robinia pseudo-acacia* L.), serviceberry (*Amelanchier* spp.), white ash (*Fraxinus americana* L.), and mountain laurel (*Kalmia latifolia* L.). With the exception of blackgum and mountain laurel, these species were not abundant in the GWNF plots.

The abundance of moth species within our two study forests depends on many factors, among them, the availability of larval host plants. Many of the species of moths reflect differences in basal area of host trees in the two forests. For example, the basal area of pine is 44% greater in the GWNF plots in comparison with the MNF plots (Table 3). Among moth species requiring pine as a larval host, we typically see a higher abundance on the GWNF: the geo-

metrids, *Semiothisa minorata* (Packard) and *Nepytia semiclusaria* (Walker); the sphingid, *Lapara coniferarum* (J.E. Smith); and the noctuid *Zale helata* (J.B. Smith). Species with larval hosts of *Prunus* spp. (*Lomographa* spp., *Probole alienaria*, *Paonias* spp.); *Robinia* (*Zale unilineata* (Grote), *Euparthenos nubilis* (Hübner); or *Betula* spp. (*Drepana arcuata* Walker, *Acronicta fragilis* Guenée) were typically more abundant in the MNF where the greater vegetational diversity included these tree species in greater abundance. Species with larval hosts of blackgum (*Allotria elonympha* (Hübner), *Polygrammate hebraicum*) were more abundant in the GWNF where blackgum was 84% more abundant in the core plots.

Abundance of selected moth species (Table 4) was highly variable among the 18 plots, and did not relate clearly to abundance of the preferred larval host plant on the plots. For example, while *Semiothisa minorata* was generally more abundant in the GWNF with the highest basal area of pine (Table 3), the highest abundance was not on plot 9 with the highest basal area of pine (10.16) in the core plot. Instead, the highest abundance was trapped on plot 3, with only half the pine basal area. *Hypoprepia fucosa*, larvae of which are lichen feeders, was relatively evenly distributed among the plots. The *Idia* spp. whose larvae of which are litter feeders were abundant on all plots with the exception of plot 10. Plot 10 showed a relatively low abundance of most of the selected species (Table

4) except *Hydrelia inornata*, a maple feeder, and *Hypoprepia fucosa*, the lichen feeder. Plot 10 had a higher basal area of maple than any other tree species emphasized in our study. Much of plot 10 is covered with boulders and rock rubble that is frequently covered with lichens. While the highest count of black cherry in the understory of the core plots occurred on plot 12, the highest catch of the cherry-feeder, *Lomographa vestaliata*, occurred in plot 11. Highest numbers of black locust trees were in core plot 12, corresponding with the highest catch of *Euparthenos nubilis* and relatively high catch of *Zale unilineata*, larvae of which are locust specialists.

Examination of the flight period for the 438 lepidopteran species in this study indicates that some species have broad seasonal ranges while others are more restricted (Table 1). True seasonal ranges are best assessed for those species that were caught in relative abundance. Broad flight periods occur for some univoltine species with unsynchronized eclosion periods such as the notodontid *Heterocampa guttivitta* (Walker), the arctiids *Hypoprepia fucosa* and *Spirosoma congrua*, and the noctuids *Polia destructa* (Walker) and *Polia latex* (Guenée). Broad flight periods may reflect bivoltine or multivoltine life cycles as, for example, the geometrids *Melanolophia canadaria* (Guenée), *Hypagyrtis unipunctata*, *Lomographa vestaliata* (Guenée), and the *Lambdina* spp.; the saturniid, *Dryocampa rubicunda* (F.); the notodontid, *Heterocampa umbrata* Walker; the arctiids, *Clemensia albata*, and *Halysidota tessellaris*; and the noctuids *Idia aemula*, *I. rotundalis*, and *Zale minerea* (Guenée). Examples of species with narrow flight periods include the univoltine lasiocampids *Malacosoma* spp. and the arctiid, *Hyphantria cunea* (Drury).

Considerable fluctuation occurred over the 15-week period of each season regarding species numbers and abundance (Figs. 1–2). Generally, the number of species was higher in the GWNF in the spring and higher in the MNF in the summer sampling pe-

riods. No defined peak was noted in species numbers; about 125 species per week were trapped from late May to August. Weekly abundance was generally lowest in the spring sampling periods and highest in July and early August. The highest abundance over the two year period was taken in the MNF on 9 July 1996. Lowest richness and abundance occurred in both forests on the nights of 13 June 1995 and 14 May 1996. While minimum temperatures were not unseasonably low on 13 June (13°C), it was the night of the full moon with 0.999 percent illumination. On 14 May 1996, moon-phase was not a factor (3.2 days before the new moon), but minimum temperature was near 0°C for both forests.

#### DISCUSSION

During our two-year study, we collected 438 species of moths, 379 species in the GWNF and 393 species in the MNF. In each forest, blacklight traps were operated at 9 different locations. The numbers of species we collected in this study are consistent with species numbers in hardwood forests in some other studies. Moulding and Madenjian (1979) trapped 410 species of macromoths in a virgin oak forest in New Jersey over a five-year period. Rings et al. (1987) recorded 426 species of macromoths over 9 years in Stark County, Ohio. Work et al. (1998) identified 256 species in 8 red-oak dominant stands in Northern Michigan. Butler and Kondo (1991) trapped 400 species of macromoths with a single 15 watt blacklight trap at one site at Coopers Rock State Forest, WV over a three year period. Butler et al. (1995) trapped 376 species on four small adjacent watersheds at Fernow Experimental Forest, Tucker County, WV over a 5-year period.

Many species were trapped in the current study that were not recorded in the Coopers Rock or Fernow Studies. Several explanations are possible. The vegetation makeup of the current study included significant stands of pine, spruce, or hemlock not present at the earlier study locations. Species

Table 4. Lepidopteran abundance by plot for 1995 and 1996, combined. Host associations of larvae are indicated.

Species	Plot					
	1	2	3	4	5	6
<i>Semiothisa minorata</i> (Packard) <sup>1</sup>	72	67	124	61	66	106
<i>Lomographa vestaliata</i> (Guenée) <sup>2</sup>	21	22	14	15	0	5
<i>Hydrelia inornata</i> (Hulst) <sup>3</sup>	21	20	20	25	8	29
<i>Lapara coniferarum</i> (J.E. Smith) <sup>1</sup>	27	33	20	75	43	68
<i>Hypoprepia fucosa</i> Hübner <sup>4</sup>	475	288	225	277	386	450
<i>Idia aemula</i> Hübner <sup>5</sup>	312	135	128	360	628	435
<i>Idia rotundalis</i> (Walker) <sup>5</sup>	454	300	240	248	466	381
<i>Zale helata</i> (J.B. Smith) <sup>1</sup>	9	14	12	72	19	31
<i>Zale unilineata</i> (Grote) <sup>6</sup>	10	24	12	7	6	6
<i>Euparthenos nubilis</i> (Hübner) <sup>6</sup>	15	2	3	3	4	1
<i>Allotria elonympha</i> (Hübner) <sup>7</sup>	58	28	69	27	41	30
<i>Acronicta ovata</i> Grote <sup>8</sup>	562	334	262	452	735	575
<i>Polygrammate hebraeicum</i> Hübner <sup>7</sup>	498	303	222	932	384	786
Total	2,534	1,570	1,351	2,554	2,786	2,903

#### Host Associations

<sup>1</sup> Pine.

<sup>2</sup> Black Cherry.

<sup>3</sup> Maple.

<sup>4</sup> Lichen.

<sup>5</sup> Litter.

<sup>6</sup> Black Locust.

<sup>7</sup> Black Gum.

<sup>8</sup> Oak.

in the current study associated with these conifers include the geometrids, *Caripeta angustiorata* Walker, *C. aretaria* (Walker), *Patalene olyzonaria* (Walker), the sphingid, *Lapara coniferarum*, and the noctuids, *Zale squamularis* (Drury), *Z. submediana* (Strand), *Z. duplicata* (Bethune), *Z. helata*, *Z. bethunei* (J.B. Smith), *Panthea acronyctoides* (Walker), and *P. furcilla* (Packard) (Covell 1984; Forbes 1948, 1954). Several species in the current study are considered to be uncommon: the geometrids, *Orthofidonia flaviventa* (Hulst), *Lytrosis permagnaria* (Packard), *Caripeta aretaria*, the notodontid *Hyparpax aurora* (J.E. Smith), and the noctuids, *Zanclognatha martha* Barnes, *Zale squamularis*, *Z. submediana*, *Z. bethunei*, *Catocala connubialis*, Guenée, *Cermacora* Hübner, *Acronicta tritona* (Hübner), *A. spinigera* Guenée, *Oligia bridghami* (Grote and Robinson), *Homohadena infixata* (Walker), and *Sideridis congermana* (Morrison)

(Covell 1984; Forbes 1948, 1954; Rings et al. 1992).

Because our light trapping period extended only for a 15-week period in May, June, July, and August, moth species that fly before or after that time were not collected. Species in this category that have been collected as larvae in our plots (Butler and Strazanac 2000a,b) include the geometrids *Alsophila pometaria* (Harris), *Phigalia denticulata* Hulst, *P. strigataria* (Minot), *Erannis tiliaria* (Harris), *Lambdina fiscellaria* (Guenée), and the noctuids, *Cosmia calami* (Harvey), *Lithophane quequera* Grote, *L. grotei* Riley, *Eupsilia* n. sp., *E. morrisoni* (Grote), *Xystocephalus rufago* (Hübner), *Eutolype rolandi* Grote, *Copipanolis styracis* (Guenée), *Orthosia hibisci* (Guenée), and *Himella intractata* (Morrison).

Several groups were not fully identified. It is likely that additional species of *Eupithecia* (Geometridae) are present in our

Table 4. Extended.

Plot													Total
7	8	9	10	11	12	13	14	15	16	17	18		
114	68	64	4	1	0	58	48	7	30	24	93	1,007	
7	7	5	17	245	189	50	18	30	129	53	144	971	
30	14	16	550	537	1,552	226	223	391	250	234	197	4,343	
10	38	34	0	2	0	12	16	2	5	12	55	452	
318	537	354	390	555	521	609	558	346	610	219	249	7,367	
269	1,301	564	91	217	230	154	177	191	222	50	116	5,580	
404	368	258	42	357	238	1,455	689	759	401	699	705	8,464	
12	12	11	0	0	9	2	2	1	5	0	12	223	
5	29	6	14	51	35	13	45	31	18	1	9	322	
3	18	7	9	20	27	11	18	18	14	9	5	187	
20	30	27	0	1	0	1	2		1	0	1	336	
117	620	485	38	207	347	1,865	3,574	230	1,442	500	1,664	14,009	
166	360	590	1	13	2	86	70	9	328	96	64	4,910	
1,475	3,402	2,421	1,156	2,206	3,150	4,542	5,440	2,015	3,455	1,897	3,314	48,171	

samples. The arctiid *Holomelina opella* (Grote) included some *H. nigricans* Reakirt. The lymantriid *Dasychira* spp. includes *D. dorsipennata* (Barnes and McDunnough), *D. obliquata* Grote and Robinson, *D. basiflava* (Packard), and *D. plagiata* (Walker).

*Dasychira* specimens in the light traps were frequently rubbed leaving the pattern difficult to distinguish. Most of these species are highly variable in wing pattern and lack distinctive genitalia (Ferguson 1978).

Among the moth species collected exclu-

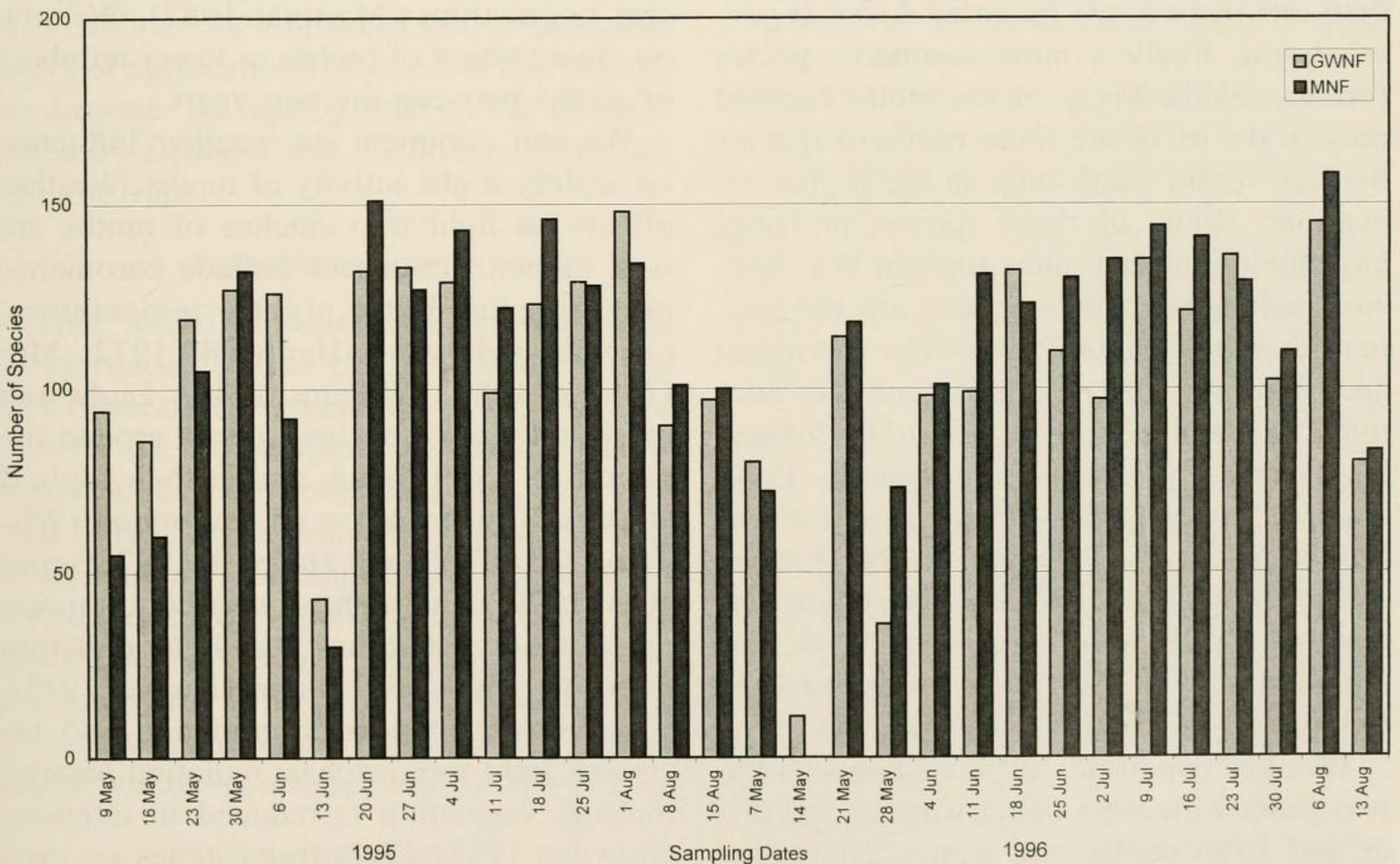


Fig. 1. Lepidopteran species numbers over 15 week sampling periods during 1995 and 1996 in the George Washington (GWNF) and (MNF) Monongahela national forests.

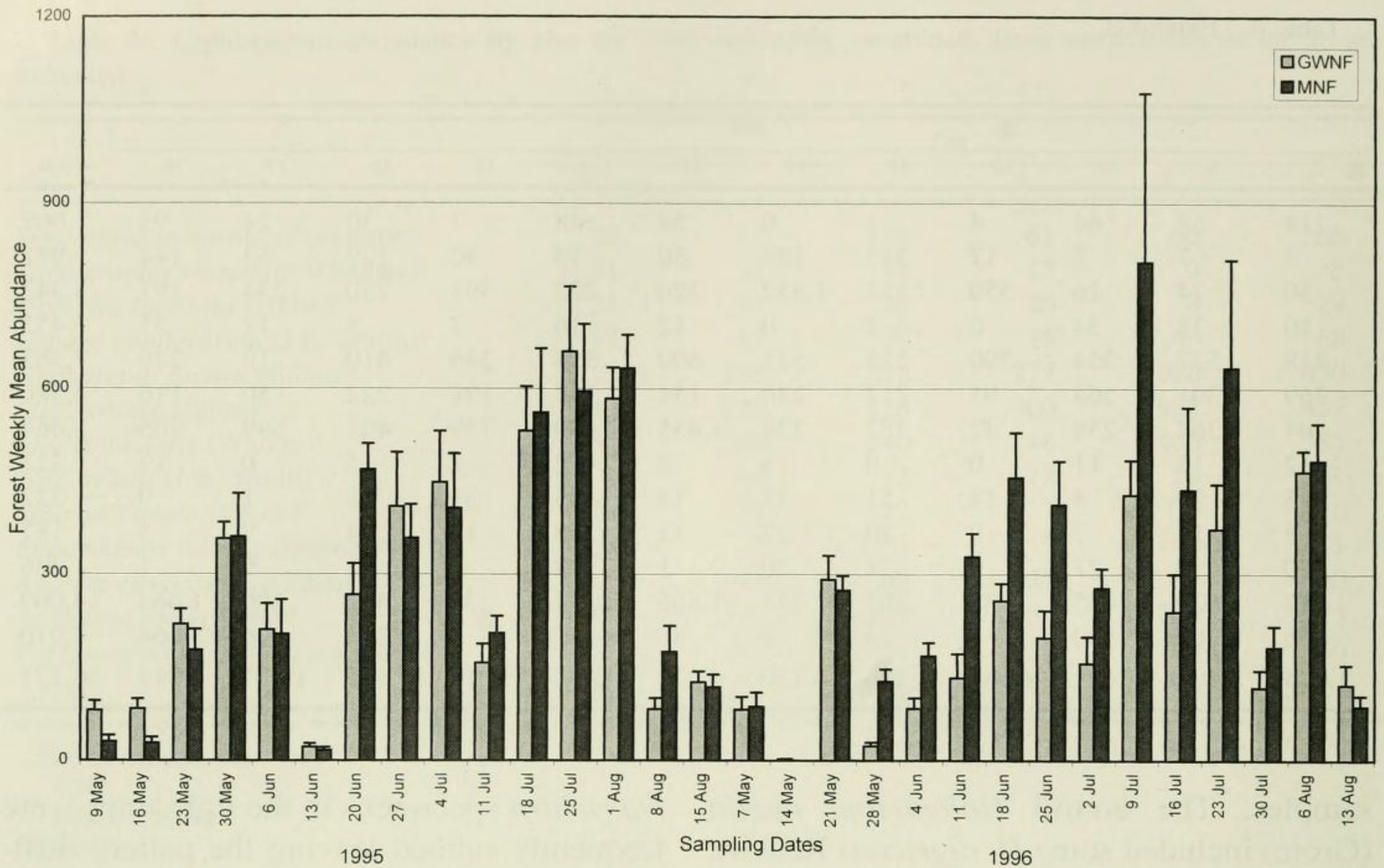


Fig. 2. Lepidopteran weekly mean abundance over 15 week sampling periods during 1995 and 1996 in the George Washington (GWNF) and (MNF) Monongahela national forests.

sively in the GWNF in numbers greater than one or two, we recorded *Lytrosis permagnaria*, likely a more southern species (Forbes 1948). Many of the moths trapped only in the MNF are more northern species that are found south only in the higher elevations. Some of these species probably have their southern range limit in WV. Species included in this category are the geometrids *Itame evagaria*, *Epirrhoe alternata*, and *Heterophleps refusaria*; and the noctuids *Lithacodia concinnimacula*, *Phlogophora iris*, *Lithophane innominata*, *Polia nimbosea*, *Lacinipolia olivacea*, and *Pseudorthodes vecors* (Covell 1984; Forbes 1948, 1954). The geometrid, *Aethalura in-texta* (Walker) is considered to be uncommon (Covell 1984), but we recorded 30 individuals in the MNF in two years.

Weather conditions differed between the two years with 1995 being warmer and drier and 1996 cooler and wetter. Numerous studies have shown direct and indirect effects of weather trends and atypical cata-

strophic temperature and rain events on insect populations (Martinat 1987). We saw no clear pattern of higher or lower numbers of moths between the two years.

We can comment on weather influence on nightly flight activity of moths. Weather effects on light trap catches of moths are well known. Influences include barometric pressure, humidity, nightly temperature, rainfall, and wind (Hardwick 1972, McGeachie 1989, Williams 1940). Light-trap catches are often at their lowest around the period of a full moon, and at their highest at periods of no moon or new moon (Williams 1936, Yela and Holyoak 1997, Butler et al. 1999). The night sky without a moon gives about 140 times less light radiation than one with a full moon (Kuiper 1938). Cloud cover reduces illumination and increases light-trap catches; radiation passing through vegetation is reduced in intensity (Bowden 1982). Light-trap catches are generally higher on warm, humid nights with no moonlight (McGeachie 1989). In sam-



pling of noctuid moths by light trap in Spain, temperature was the dominant environmental factor influencing trapped moth numbers (Yela and Holyoak 1997). Average light trap catch varied 6- to 9-fold because of changes in temperature. Moonlight and cloud cover were second in influence and caused light trap catches to vary by 2-fold (Yela and Holyoak 1997). In our current study, nights of reduced sample size were influenced by full moon or unseasonably low temperatures (Butler et al. 1999).

During this study, sampling was restricted to a 15-week period, May through mid-August. While 438 species indicate relatively high diversity, increasing the length of the sampling season and sampling for additional years would produce records for many additional species. Other factors also limit species numbers as sampled by blacklight trap. All nocturnal lepidopterans do not respond equally well, or at all, to wavelengths emitted by blacklight traps; some species do not disperse far from the site of the larval host plants (Grimble et al. 1992).

In future publications from this study, we will evaluate the impact of two consecutive years of applications of *Bacillus thuringiensis kurstaki* on lepidopteran larvae as measured by richness and abundance of moths in light traps.

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